

What is claimed is:

1. A method for generating a power with high efficiency by a stand-alone MHD power generation apparatus, comprising the steps of:

(a) regenerating high temperature waste heat from an MHD generator of said MHD power generation apparatus as sensible heat of fuel and chemical energy, wherein the step of regenerating high temperature waste heat includes the three steps of:

a thermo-chemical coal gasification step in which the waste heat of the exhaust gas from said MHD generator is converted into chemical energy of coal syngas by a coal gasification furnace;

a pre-heating step in which the waste heat of said exhaust gas through said coal gasification furnace is recovered as sensible heat of coal syngas and hydrogen mixture by a fuel pre-heater; and

an iodine – sulfur reaction step in which the waste heat of said exhaust gas through said fuel pre-heater is converted into hydrogen chemical energy by iodine – sulfur reactions, and

(b) re-circulating the regenerated energy to a combustor of said MHD power generation apparatus, and said fuel of the coal syngas and hydrogen is combusted with pure oxygen.

2. A system for generating a power with high efficiency by a stand-alone MHD power generation apparatus comprising:

an MHD power generation apparatus having a combustor for combusting a pre-heated CO₂-free mixture fuel of hydrogen and coal syngas with pure oxygen, and an MHD generator for producing electric power with combustion plasma as an operational fluid, which is produced in said combustor;

a coal gasification furnace for converting coal and water into a mixture of coal syngas, carbon dioxide and steam with the use of the high temperature waste heat from said MHD generator;

a fuel pre-heater for pre-heating said mixture fuel, with the waste heat of the high temperature mixture of coal syngas, carbon dioxide and steam from said coal gasification furnace, and the high temperature MHD exhaust gas which bypassed the coal gasification furnace;

an iodine – sulfur reaction unit operated with waste heat of said fuel pre-heater

for decomposing the water into hydrogen and oxygen by sequential reactions between iodine and sulfur chemicals, wherein the hydrogen is mixed with CO₂-free coal syngas sent from a CO₂/fuel separator, while the oxygen is sent to said combustor, and is used as a part of the necessary oxidizer; and

a carbon dioxide/fuel separator for liquefaction of the carbon dioxide by means of isothermal compression and adiabatic expansion, and removal of liquid carbon dioxide from the mixture coal syngas exhausted from said iodine -- sulfur reaction unit after being passed through a filter for removal of water and solid potassium sulfate.

3. The MHD stand-alone high efficiency power generation system according to claim 2 characterized by pre-heating of said carbon dioxide-free coal syngas prior to be mixed with the hydrogen produced in the iodine - sulfur reaction unit, with the waste heat of the mixture coal syngas from said iodine - sulfur reaction unit.